

**OPERATING MANUAL**  
**FOR**  
**AGRI-THERM II HANDHELD DIFFERENTIAL THERMOMETER**

**MODEL 6110.4ZL**

**TEMPERATURE RANGE:  
-40°C to 100°C or -40°F to 212°F**

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# **CHAPTER 1**

## ***INTRODUCTION***

**E**verest Interscience, Inc., offers the most sophisticated non-contact infrared thermometers on the market today. The new ***AGRI-THERM II*** Handheld Differential Infrared Thermometer (Model 6110.4ZL) is the culmination of over thirty-eight years of research and development by our founder and President. These are revolutionary handheld infrared thermometers, as they can be focused in the field or lab using our ***Vario-Zoom*** (Patent Pending) variable focusing system. And they incorporate our TTL (Through-The-Lens) Intra-Optical Light Sighting System (Patent No. 4,494,881).

An infrared thermometer measures the temperature of a target surface by focusing a spot on the target through an optical field-of-view (telescope) onto a temperature-sensitive detector. Infrared radiation is transmitted through the optics and impinges on the infrared detector, heating it slightly.

A major shortcoming of infrared thermometers is that the infrared “light” (radiation) is invisible to the human eye. Therefore, the position and physical characteristics of the spot being measured, such as its location, shape, size, surface texture, etc., cannot be ascertained by the operator. It is very important for the operator to know where all parts of the target spot are located, because, if any part of the spot is off the edge of the target surface, serious reading errors will occur. The Everest TTL (Through-The-Lens) Intra-Optical Light Sighting System (Patent No. 4,494,881) solves this problem as explained in Chapter 3 of this manual.

The Model 6110.4ZL Portable Infrared Thermometers takes readings in a fraction of a second over a temperature range of -40°C to 100°C or -40 to 200°F with 0.1° resolution.

The ***AGRI-THERM II*** Differential (Patent No. 4,301,682) Handheld Infrared Thermometer is light-weight, weighing less than two pounds. It is powered by rechargeable nickel-cadmium batteries and has a standard output of 10.0mV/°C or °F.

We are pleased that you chose an Everest infrared surface thermometer. We are positive that you will be pleased with the versatility, dependability and reliability that have been engineered into these highly sophisticated infrared thermometers.

If you have questions about a particular application, or if you have difficulty with any aspect of the operation or functioning of your new infrared thermometer, please don't hesitate to contact us. Our telephone numbers and addresses are listed on the front cover of this manual.

## **1.1 UNPACKING YOUR *AGRI-THERM II* INFRARED THERMOMETER**

**W**hen you unpack your *AGRI-THERM II* Infrared Thermometer, please be sure the following items are enclosed:

1. Your new Model 6110.4ZL *AGRI-THERM II* Infrared Thermometer
2. A Carrying Case
3. A Battery Charger
4. A Signal Output Cord
5. A Certification of Calibration
6. An Operating Manual

If any items are missing or appear to have been damaged during shipment, please save the shipping box and notify Everest Interscience immediately at (520) 792-4545, Toll Free at (800) 422-4342 or by E-mail to [info@EVERESTInterscience.com](mailto:info@EVERESTInterscience.com).

# **CHAPTER 2**

## ***OPERATING INSTRUCTIONS***

### **2.1 BATTERY CHARGING PROCEDURE**

**Y**our ***AGRI-THERM II*** has been charged at the factory before shipment. However, you may want to charge it again overnight before extended use. To recharge the batteries in your ***AGRI-THERM II*** Infrared Thermometer, plug the plug on the end of the six-foot lead of the supplied battery charger into the Rear Panel Jack of the infrared thermometer labeled “BATT.” The “BATT” jack can be found on the left hand side of the Rear Panel. Then, plug the AC adaptor into 90-250 Volt AC 50/60 Hz power source.

Allow ten (10) hours for a complete charge; partial charges are okay. When charging is complete, unplug the AC adaptor from the outlet and then remove the plug from the instrument.

### **2.2 ABBREVIATIONS ON REAR PANEL**

**T**he abbreviations on the Rear Panel of the ***AGRI-THERM II*** stand for the following:

- ✓ SEL = Select: IR, DIFF or AMB
- ✓ IR = Infrared Surface Temperature Reading  
This is the current infrared surface temperature reading of the target that the instrument is focused on.
- ✓ DIFF = Temperature Differential  
This is the Difference between the Dry Bulb Ambient Air Temperature and the Temperature of the target.
- ✓ AMB = Dry Bulb Ambient Air Temperature  
This is the temperature of the ambient air surrounding the Infrared Thermometer.
- ✓ PWR = Power: On/Off
- ✓ LITE = TTL Intra-Optical Light Sighting: On/Off
- ✓ DATA = Plug for outputting the data selected by “SEL” at the rate of 10mV/°.
- ✓ BATT = Place to plug in battery charger.

## **2.3 TURNING THE INSTRUMENT ON**

**S**imply move the toggle switch on the Rear Panel entitled “PWR” to On. The “PWR” switch is located on the left side of the Rear Panel.

## **2.4 EMISSIVITY SETTINGS (Target Emission Efficiency in %)**

**E**missivity Compensation is done by pushing the “plus” (+) or “minus” (-) buttons on the Rear Panel of the infrared thermometer. Press the “+” or “-” to set in the Emissivity you desire.

## **2.5 SURFACE TEMPERATURE MEASUREMENT**

**T**he infrared surface temperature measurement can be made by selecting “IR” by pushing the “SEL” button the number of times necessary until the light comes on above “IR.” Then, when the instrument is on, the numbers on the display indicate the Infrared Surface Temperature.

## **2.6 TEMPERATURE DIFFERENTIAL**

**T**o take the Temperature Differential (Patent No. 4,301,682) between the target temperature and the dry bulb ambient air temperature, first press the “SEL” button the number of times necessary until the light is shown above “DIFF.” Then, pull the antenna out of the front of the instrument. This removes the sensor on the end of the antenna from the heating and cooling effects of the instrument and the operator’s hand. Now, when the instrument is on, the Temperature Differential will be read out on the Liquid Crystal Display. Let the instrument equilibrate for at least ten (10) minutes before making Differential readings for better accuracy.

## **2.7 AMBIENT TEMPERATURE MEASUREMENT**

**T**he Dry Bulb Ambient Air Temperature can be measured by pushing the “SEL” button the number of times necessary until the light is on above the “AMB” notation. Now, when the infrared thermometer is on, the display is indicating the Dry Bulb Ambient Air Temperature.

The following photograph shows where the “SEL,” “IR,” “DIFF,” and “AMB” buttons are located:



## 2.8 “DATA” OUTPUT

The “DATA” output is on the upper right hand side of the face place of the **AGRI-THERM II**. The instrument is provided with a signal cord to connect to a data logger through this receptacle. No data is stored in the infrared thermometer itself. The “DATA” connection provides for the capability of running the **AGRI-THERM II** continuously and sending the data to an outside source where the analog signal can be converted to a digital signal and the data can be logged and saved.

## **CHAPTER 3**

### ***THROUGH-THE-LENS (TTL) INTRA-OPTICAL LIGHT SIGHTING (Patent No. 4,494,881)***

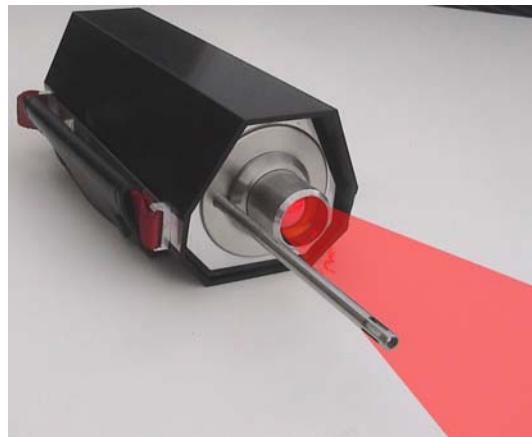
#### **3.1 TTL SIGHTING**

**W**ith the Everest Through-The-Lens (TTL) Intra-Optical Light Sighting System (Patent No. 4,494,881), an illuminated image of the infrared detector is projected directly through the infrared optics of the infrared temperature sensor, illuminating the exact area where a temperature measurement is being taken. Because this light shares the internal optical path, it can never be knocked out of alignment. It will always illuminate the area where the infrared/visible optics are focused.

#### **3.2 FOCUSING WITH THE *VARIO-ZOOM***

**I**n order to focus on a smaller or larger area, the front of the *Vario-Zoom* (Patent Pending) infrared thermometer need only be pushed in or out until the target is completely illuminated. Simply point the instrument at a target in subdued ambient light and push the front optics in or pull it out in order to focus the infrared thermometer to display the field-of-view (FOV) of the instrument.

A picture of the Front Optics of the *AGR-THERM II* Infrared Thermometer with the antenna extended for Dry Bulb Ambient Air Temperatures is shown below:



To focus an instrument that will be used in the field or out-of-doors, first set the instrument up in subdued lighting in a laboratory. There you will be able to see the light being emitted by the Light Emitting Diode (LED) and determine the distance to spot size ratio. Then, when you are in the field, you can determine the area being measured by knowing that the ratio of the distance to spot size will remain constant as it was in the lab.

# CHAPTER 4

## SPECIFICATIONS

### 4.1 AGRI-THERM II (Model 6110.4 ZL) SPECIFICATIONS

#### **TEMPERATURE MEASUREMENT**

Scale Range:	-40°C to 100°C or -40°F to 212°F
Resolution:	0.1°C or 0.1°F
Accuracy:	±0.5°C or ±1.0°F
Repeatability:	±0.1°C or ±0.2°F
Temperature:	All Functions in °C or °F, corresponding to voltage out
Noise Effective Temperature:	<0.1°C or °F
Measurement Modes:	Surface Temperature, Dry Bulb Temperature and Temperature Differential (Patent No. 4,301,682)

#### **OPTICAL CONSIDERATIONS**

Optical Configuration:	Robust, aerospace-quality, double-coated Zinc Selenide Optics per Military Specification MIL-C-13508
Spectral Pass Band:	8 < Wavelengths < 14 Microns
Sighting:	Intra-Optical Light Sighting (Patent No. 4,494,881): Visible Light Illuminates Field of View (FOV)
Illumination Source:	Light Emitting Diode -- SAFE – NO LASERS!
Focus:	Variable from 2° to 20° with <b>Vario-Zoom (Patent Pending)</b>
Display:	Numeric on Liquid Crystal Display on Rear Panel

#### **OPERATING CONDITIONS**

Operating Environment:	-20°C to 65°C or +14°F to 150°F, up to 99% Relative Humidity, Non-Condensing
Storage Temperature:	Same as Operating Environment Temperature

#### **GENERAL**

Response Time:	<1 Second
Emissivity Compensation:	Settable from 10% to 99% on Rear Panel
Operating Distance:	2 cm to Infinity

#### **ELECTRICAL INTERFACE**

Power Source:	Rechargeable Nickel Cadmium Rechargeable Batteries 200 Hours Continuous Use on Full Battery Charge
Output Signal:	-400 mV to 1000 mV at 10 mV/°C
Battery Charger:	90-240 Volt, 48-62 Hz

#### **WARRANTY**

Warranty:	One Year-Limited Warranty of Parts & Labor
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Everest Interscience, Inc. has a policy of continued design upgrade. Therefore, we reserve the right to change specifications without notice

# **CHAPTER 5**

## **MAINTENANCE**

### **5.1 GENERAL**

**T**his *AGRI-THERM II* will be virtually maintenance free. It is recommended, however, that the instrument be returned to the factory after 24 months for a calibration check and recalibration, if necessary.

It is important that you return the original battery charger with the instrument and to use this battery charger only when recharging your infrared thermometer.

When returning the *AGRI-THERM II* for repair or recalibration, please call Toll Free at **1-800-422-4342** or **1-520-792-4545** to receive a Return Material Authorization (RMA) No. You can also request the RMA by E-Mail to [info@EVERESTInterscience.com](mailto:info@EVERESTInterscience.com) or an RMA form can be obtained on our website at [www.EVERESTInterscience.com](http://www.EVERESTInterscience.com). After receiving the RMA No., please ship the instrument insured, freight prepaid, to:

EVEREST INTERSCIENCE  
1891 North Oracle Road  
Tucson, AZ 85705-6444  
USA

Please include an explanation of the problem or problems you are having or the service that you want performed.

### **5.2 CLEANING**

**P**eriodically the infrared thermometer may need to be cleaned. Use a damp cloth to remove any debris on the outside of the instrument.

To clean the optical lens, use denatured alcohol and a Q-Tip to wipe off any residue on the front optics. Do not use anything other than denatured alcohol to clean the optics.

## CHAPTER 6

### **ONE-YEAR LIMITED WARRANTY SERVICE INSTRUCTIONS**

**E**verest Interscience warrants each instrument to be free of defects in material or workmanship for a period of one year from the date of shipment to the original purchaser.

When examination of the instrument reveals that the fault has not occurred because of misuse or abnormal conditions of operation, Everest Interscience will service, replace or adjust any defective part or parts when the instrument is returned freight prepaid. **OEM clients must show that recurring errors are not a part of the customer's assembly integration process. Upon the advice of Everest Interscience, certain malfunctions will be considered to be due to these process techniques and this warranty will be considered null and void for any instruments subjected to those methods.**

Instruments repaired when abnormal usage has occurred or beyond the effective date of the warranty will be charged at applicable rates. Everest Interscience will submit a quotation for the estimated charges before commencing repair. The customer must provide a Purchase Order or credit card information in the amount of the repair and return shipping before work will commence. After Everest has sent the repair quotation, the customer has up to one year to provide a Purchase Order or credit card information to Everest for either the repair and return or the return only of the instrument. If the customer does not provide this information within one year, Everest will recycle the instrument.

Instruments whose warranty expiration dates exceed five years from the current date may be subject to denial for service and repair. In such instances, please contact the Service & Repair Division at **(520) 792-4545**.

This warranty includes recalibration and battery replacement during the warranty period, if required.

***NOTE: THE WARRANTY IS NULL AND VOID IF:***

- ***The instrument has been dismantled, or***
- ***The instrument case has been deformed such as dented, gouged, tool marks are present, etc.***

If shipping from within the United States, please call **1-800-422-4342** for a Return Materials Authorization (RMA) number. Outside of the US, please call **1-520-792-4545**. Then for the United States and all other countries, please ship the instrument insured, freight prepaid to:

EVEREST INTERSCIENCE, INC.  
1891 NORTH ORACLE ROAD  
TUCSON, AZ 85705-6444 USA

Please include a letter explaining the difficulty that you are having with the instrument, or complete the RMA Form provided to you, when returning the instrument for repair. An RMA Form can be downloaded from our website: [www.EVERESTInterscience.com](http://www.EVERESTInterscience.com). It is necessary to send a check in the amount of the Evaluation Analysis Fee along with the instrument. This charge can be obtained on our RMA form on the website or by calling (800) 422-4342 or (520) 792-4545.

We apologize in advance if you do have a problem with one of our instruments. We will call you when we receive the instrument and before commencing any work on the instrument if repairs are necessary. Also, we will do all we can to repair it and return it to you as quickly as possible.